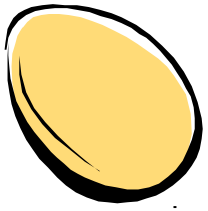
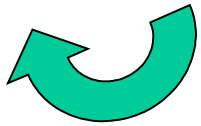


This is your Brain



Heat Injury Prevention Made Ridiculously Simple

James Mandeo
MAJ, MC
USACHPPMEUR

Workload + Hot Weather

April 2005

Outline

- What you need to know
- Numbers
- How it happens
- Unit leader actions / risk managment
- Other stuff
- What you need to know

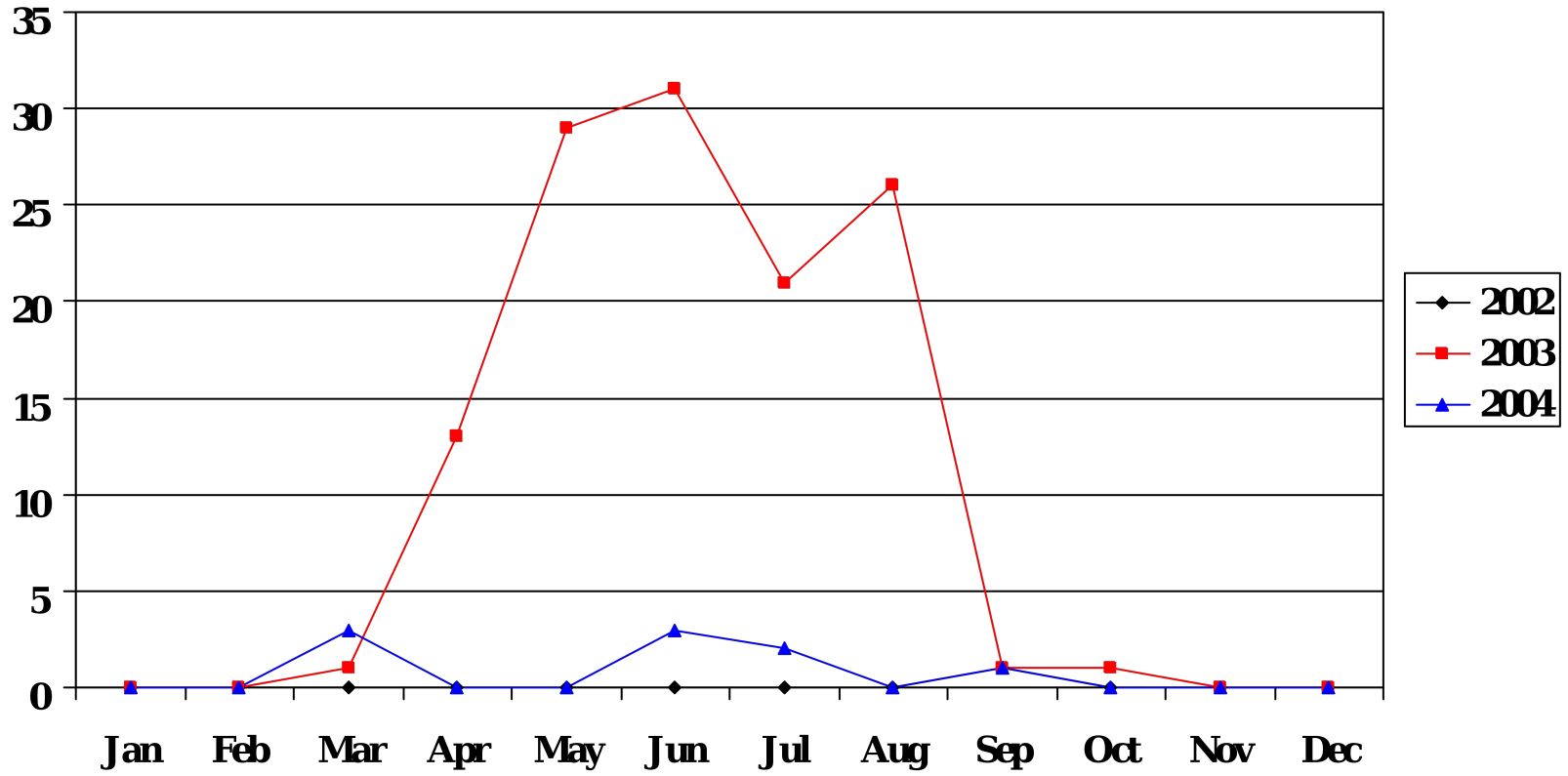
What You Need To Know

- Risk management steps
- Prevention is more important than treatment
  - Education
  - Planning
- Weak link rule (one case is a problem)
- Heat injuries are cumulative
- Deployment acclimatization 7-10 days
- Dehydration ≠ thirsty
- Febrile illness and fatigue increase risk

Risk Management Steps for Prevention ofHeat Casualties

- Identify hazards
- Assess hazards
- Develop controls
- Implement controls
- Supervise and evaluate

Hospitalizations for Heat Injury in Southwest Asia MTFs, 2002-2004



SWA Heat Injury Data, 2002-2004

- Diagnoses at hospital
  - 8% heat stroke
  - 75% heat exhaustion
  - 12% unspecified heat injury
  - 5% other (heat syncope, heat cramps)
- Rank: 81% E-5 and below
- Age risk factor
  - Average age 2003 = 27.3 years
  - Average age 2004 = 36.0 years
- 11% Female (sex not important)
- Ethnic background not important

Causes of Heat Injuries

- **Heat load increases greatly during work or exercise. Twenty times more energy is produced at maximal activity; 75 percent of that energy is converted to heat.**

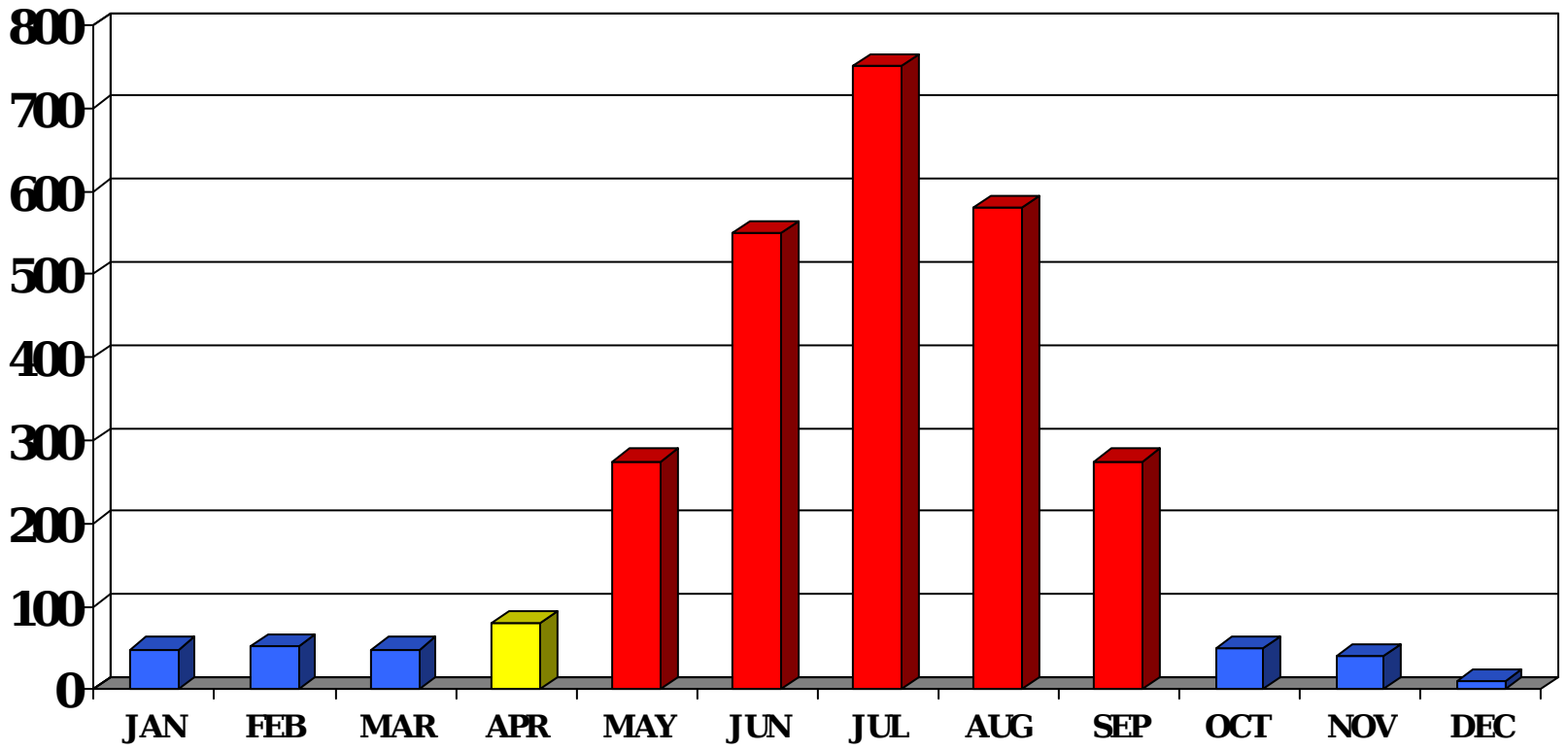
- **The body is an 8 qt evaporative radiator that gets easily overloaded by:**
  - **exercise /work**
  - **hot/humid weather**
  - **too little water**
  - **too few electrolytes (salts or minerals)**
    - **this can be caused by too much water**

- **Heat injuries can cripple or kill you by "cooking" your internal organs**

- **You cannot train your organs to tolerate getting cooked. The damage is permanent; it cannot be undone. Cooked organs cannot be overcome by willpower or motivation.**

- **<u>The only solution is prevention of heat injuries!</u>**

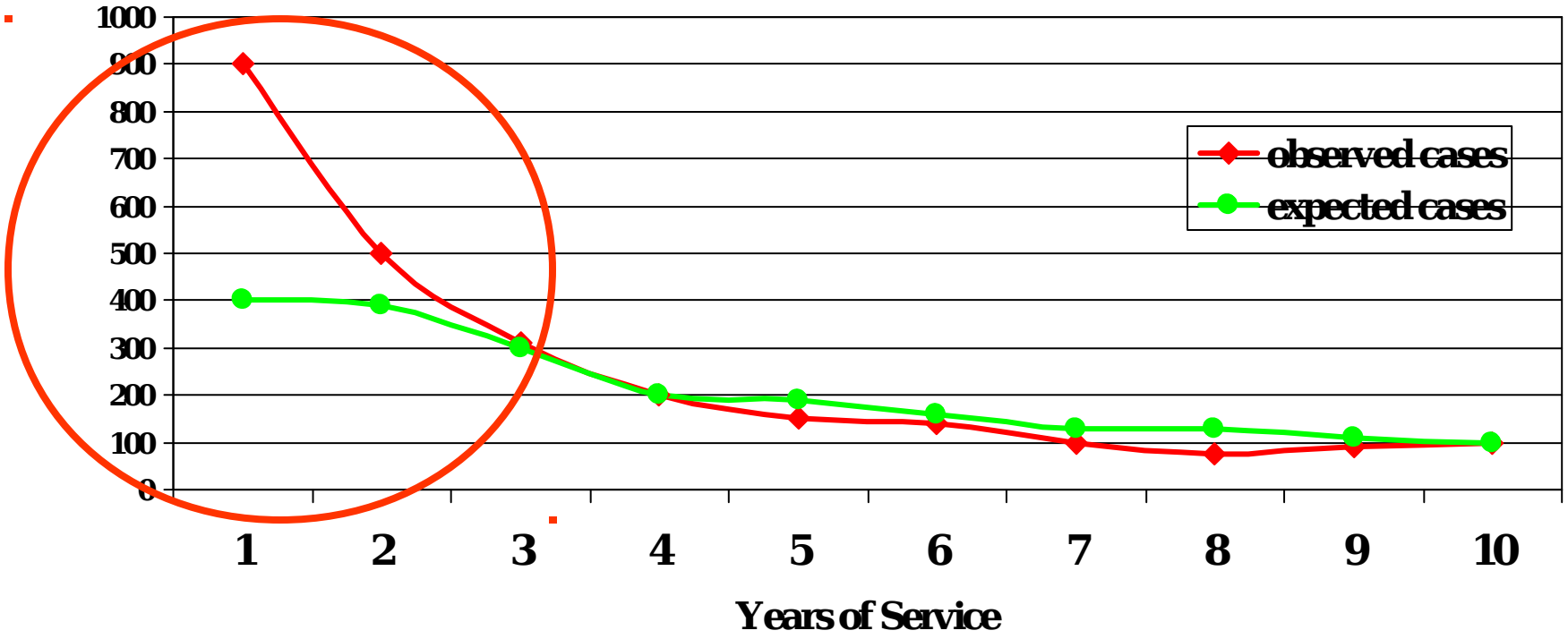
Highest Risk Months for Heat Injury



- **Risk starts at 75 degrees Fahrenheit**
- **Most heat injuries occur between April and September**
- **First 3 weeks are highest risk period (acclimatization incomplete)**

Data Source: Army Medical Surveillance Activity (AMSA) from Defense Medical Surveillance System (vol. 07/No. 03)

Number of Heat Injuries Compared to Years of Service



Soldiers in their first 18-24 months of active duty have significantly higher rates of heat injuries.

Data Source: Army Medical Surveillance Activity (AMSA) from Defense Medical Surveillance System (vol. 07/No. 03).

Risk Factors for Heat Injury

- **Sickle Cell Trait – 40x higher risk for Heat Injury**
- **Non-acclimatized**
- **Poor physical fitness status**
- **Overweight (fats act like a blanket)**
- **Illness (like upper respiratory infections, etc.)**
- **Drugs (interfere with body processes) (e.g. Sudafed)**
- **Nutritional supplements (ephedra, creatine, etc.)**
- **Donating blood (losing Red Blood Cells hurts heat adaptation)**
- **Alcohol (alcohol dehydrates)**
- **Prior heat injury**
- **Skin damage (sunburn, rash, poison ivy)**

IDENTIFY

Risk Reducing Measures to Prevent Heat Injuries

- **Monitor WBGT hourly in the area of the training (not at one or two central areas).**
- **Ensure water availability and accessibility.**
- **Use Ogden Cords (knotted cord on lapel):**
  - **Color-code Soldiers “at-risk” on cord**
  - **Monitor daily hydration (1 knot per canteen)**
- **Make changes as METT-T/Heat Category changes or when Heat casualties occur:**
  - **Events (distance, pace, breaks, etc.)**
  - **Uniform/equipment**
  - **Change “Heat Load”**
  - **Training schedule (time of day)**
  - **Work-rest cycle, etc.**

Leader Heat Injury Prevention Actions

- **Spot check troops by:**

  Confirming Buddy System is in place
  Monitoring food intake (food/snack every 4 hrs or less)
  Check Ogden cords for hydration status
  Ask questions that require lucid thought processes (What day is it? Who is your DS? Where are you?)

- **Spot check cadre**

  “What is current Heat Category?”
  “Who is at risk?” ”Who is their buddy?”
  “What actions would you take if … ”

- **Spot check medical support**
  - **Check equipment, personnel, evacuation vehicle, immediate cooling ability**
  - **If no organic medical support, check for coordination of alternatives**

IDENTIFY HAZARDS / ASSESSS HAZARDS

OGDEN Cord

Heat Injury Hazards are Cumulative

- Leaders should assess the possibility of cumulative Heat Injury

- H- Heat category past 3 days
- E- Exertion level past 3 days
- A- Acclimatization/ individual risk factors
- T- Temperature/rest overnight

- Cluster of heat injuries on prior 3 days = HIGH RISK

H.E.A.T. IMT Heat Injury Risk Management Matrix (AUG 04)

Risk Factors	Risk Level Circle the appropriate condition for each factor			
	0 **Low Risk**	**1** **Medium Risk**	**2** **High Risk**	**3** **Extreme Risk**
Risk Management Worksheet	All controls implemented			Not all controls implemented
WBGT at site NOTE: Add 5 F. for backpack or body armor	< Cat 1	Cat 1	Cat 2-3	Cat 4-5
Back-to-back Cat 5 days	0	1	2-3	>4
Heat Injuries in past 2 days	0	Heat Cramps	Heat Exhaustion	Heat Stroke/ Death
Workload in past 2 days (see TR 350-29 workload classification chart)	Easy	Easy or Moderate	Moderate or Hard	Hard
Projected workload	Easy	Easy or Moderate	Moderate or Hard	Hard
Heat acclimatization days	>13	7-13	3-6	<3
Leader/NCO presence	Full Time	Substantial	Minimal	None
Cadre duty experience	18 months	7-18 months	1-6 months	<1 month
Communication System (tested at training site)	Radio and phone	Phone only	Radio only	None
Previous 24 hours sleep	>7 hours	5-7 hours	2-4 hours	<2 hours
Food/salty snacks every 4 hours	<4 hours	4-6 hours	6-7 hours	>7 hours
Onsite 91W/CLS and iced sheets (8 single bed sheets/company in large ice water cooler)	Both	Iced sheets	91W/CLS	None
Add Circled Blocks:				

Total Score: 0-7 = Low Risk; 7-15 = Medium Risk; 16-24 = High Risk; 25-39 = Extreme Risk

>11 Total Score should have onsite 91W, Medic, and organic evacuation transportation.

Prevent: Minimizing Heat Load

- **SCHEDULE**:

  Move training (workload) to cooler parts of day
  Move training to cooler locations (shade, covered bleachers, etc.).
  Avoid direct sun, if possible

- **CLOTHING/EQUIPMENT**: CDR /Leader/ NCO may authorize:

  NOTE: Add 5 degrees to WBGT for rucksack or body armor. Add 10 degrees to WBGT if in MOPP 4.

  Heat Cat 3:
  > Unblouse BDU trousers; roll up to boot top
  > Unbuckle web belt
  > Remove Body Armor

  Heat Cat 4:
  > Same as Heat Cat 3 plus
  > Unbutton BDU blouse sleeves, then cuff x2
  > Remove t-shirt from under BDU top, or remove BDU top down to t-shirt (remove t-shirt and wear BDU top if there is direct sun exposure or the presence of biting insects)
  > Replace helmet with soft cap unless needed for safety
  > Decrease backpack load to <30 lbs

  Heat Cat 5:
  > Same as Heat Cat 4 plus
  > Remove backpack

Prevent: Minimizing Heat Load (Continued)

- **EVENTS:**
  - **Avoid strenuous, back-to-back events**
  - **Double spacing in formations (60”)**
  - **Shade Soldiers whenever possible**

    Overhead shelters in training areas

    Cool showers at the end of the day

    Modify events in Cat 4-5 weather:
    - > **Increase breaks; Synchronize rest breaks for timed events**
    - > **Shorten distance/adjust pace**
    - > **Adjust uniform**
    - > **Decrease load (remove backpacks, equipment, decrease weight, etc.)**
    - > **Train during cool (night) temperatures**

What Increases the Risk for Heat Injuries

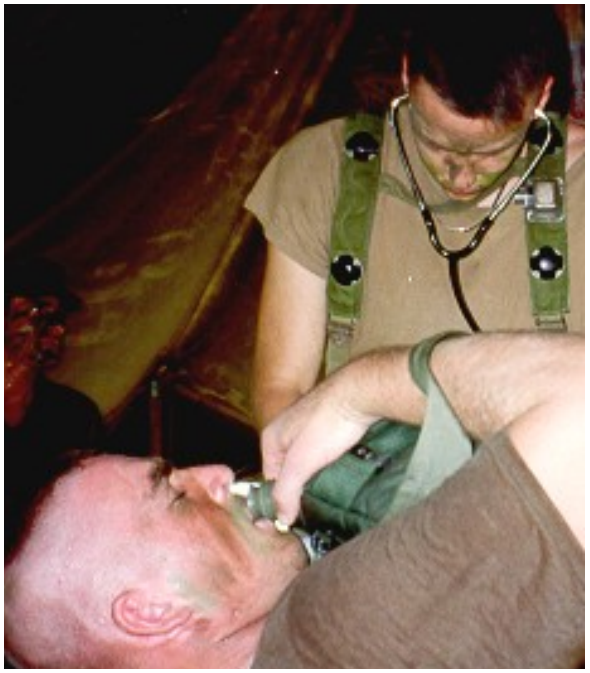
- **Not using previous 3 days of heat and workload in RM planning**
- **Not stopping and reassessing risk when Heat Injuries occur**
- **Pushing Soldiers who are showing symptoms**
- **Not adjusting workload, breaks, uniform, and equipment to Heat Category; Requiring adjustment approval away from work site**
- **Food deprivation**
- **Not hydrating before early am runs and throughout training day**
- **Ineffective Attitudes/Myths:**
  "That which doesn't kill you makes you stronger."
  "Breaking them during training prevents them from breaking in war."
  "Working harder in heat prepares them for austere desert conditions."

  Reality: Training IAW heat prevention doctrine prepares Soldiers for OIF and

What Decreases Heat Injury Risk

- **Moving work to cooler times/places (always hydrate BEFORE early am runs).**
- **Adjust work-rest cycles (TB MED 507; TR 350-29).**
- **Frequent, cool water (but no more than 1.5 qts/hr or 12 qts/day).**
- **Food (vegetables, fruits, salty snacks, electrolyte/carb/protein beverages, electrolyte/carb/protein gels) (every 4 hrs. or less).**
- **Sufficient electrolytes (salty snacks, salty soups, electrolyte beverages, electrolyte gels).**
- **Cooling (showers, fans).**
- **Adjusting clothing/equipment. Allow senior Leader/NCO on the ground to make the call.**
- **Wearing sunburn lotion (SPF 50, sweatproof, with vitamins).**

Recognizing & Treating Heat Injuries



RECOGNIZE HEAT INJURIES

- Muscle cramps
- Dizziness
- Headache
- Clumsiness, unsteadiness, staggering gait
- Irritability

- Vomiting
- Confusion, mumbling (Does not know Who, When, Where)
- Combative
- Passing out

TREAT

- STOP, REST, COOL, CALL
- **Immediate** cooling with 100% observation is critical for Heat Stroke.
  Iced sheets are best method for cooling
- When in doubt, evacuate any Soldier needing rapid cooling.
- Always remember that confusion is a BAD SIGN, not a sign of weakness.
- One Soldier stays with casualty to spot symptom changes.

Mild Heat Cramps; Mild Heat Exhaustion) -- Treat

IF Soldier has symptoms:

- Muscle cramps
- Dizziness
- Headache
- Clumsiness, unsteadiness, staggering
- Irritability

THEN

- **STOP**. Stop activity.
- **REST**. Rest Soldier flat with feet elevated on their helmet, sand bags, etc.
- **COOL**.

  Move Soldier to cool location (shade, A/C car/bldg., etc.).

  Loosen uniform/ remove BDU blouse/ remove head gear.

  Have 91W Medic or CLS evaluate Soldier.

  > **History of excessive water intake, large clear urination, poor food intake, vomiting, and/or distended abdomen? Give salty snack if conscious. Do not give water or IV.**

  > **If opposite symptoms are present, then have casualty sip 2 qts. cool electrolyte beverage as tolerated over twenty-thirty minutes. Do not force water.**

  Evacuate if no improvement in 30 min, or if Soldier's condition worsens.

  NOTE: It is important that the same person observes Soldier during treatment and evacuation in order to spot symptom changes

- **Reassess situation and check other Soldiers**

Heat Stroke -- Treat

IF Soldier is:

- **Confused, mumbling (doesn't know who, when, where; i.e. abnormal mental status)**
- **Combative**
- **Passed out**
- **Vomits**

THEN

- **STOP. Stop activity.**
- **REST. Put Soldier flat on a poncho with feet elevated on their helmet, sand bags, etc.**
- **COOL.**

  Move to cool location (shade, etc.)

  Strip BDU and boots off to underwear (t-shirt/briefs).

  NOTE: Saving a life is more important than modesty, but ensure a same gender helper is present

  Immediately cool Soldier with iced sheets (best). Cover top of head and all exposed skin with iced sheets.

  Soak with water if iced sheets are not available.

  Fan the entire body.

  Stop cooling if shivering occurs.

  CLS/91W evaluate casualty:

  >History of excessive water intake, large clear urination, poor food intake, vomiting, and/or distended abdomen? Give salty snack if conscious. Do not give water or IV.

  >If opposite symptoms from above, then have casualty sip cool electrolyte beverage as tolerated (if awake). Do not force water. If evac delayed >10 min, give 500 cc Lactated Ringers or Normal Saline IV.

- **CALL. Call for evacuation. Continue cooling enroute.**
- **Reassess situation. Evaluate other Soldiers. Treat any other Soldier with**

Treat: Immediate, rapid cooling

Cooling is first priority- can reduce death rate from 50% to 5%

- Put in shock position (feet elevated) on a poncho.
- Strip BDU off to underwear (t-shirt/briefs).
- Apply iced sheets. Cover top of head and as much exposed skin as possible with iced sheets.
- Soak with water.
- Fan.
- Massage large muscles while cooling.
- When sheets warm up, apply fresh, cold sheets or put them back into cooler and then reapply.
- 100% observation by the same Soldier.
- Stop cooling if shivering occurs or when rectal temp drops to 100 F. (91W task)
- CLS/91W evaluate casualty before giving water or IV.
- Evacuate. Continue cooling enroute

Iced Sheet Treatment

Stop cooling when casualty starts shivering or rectal temp is 100 F. (91W task)

Basic load: 8 sheets/company in large cooler of ice water.

Heat Injury Evacuation criteria

- **Loss of consciousness or other mental status changes**
- **Vomits more than once**
- **No improvement after 30 min. of rest and hydration**
- **General deterioration/worsening during treatment**
- **Rectal temp >104 (91W task)**

- **Evacuate any soldier to the hospital that requires cooling with iced sheets due to abnormal mental status**

Water Intoxication (Hyponatremia)

- Frequently occurs in basic training units
- Mental status changes
- Vomiting
- History of consumption of large volume of water
- Poor food intake
- Abdomen distended/bloated
- Large amounts of clear urine

- Do not give more water or IV! If awake, allow Soldier to consume salty foods/snacks

Medical Support Issues?

Difficulties exist with transportation

Enrich CLS training and decision guidance to include iced sheet treatment.

Carry iced sheets in large ice water cooler.

Coordinate for non-military ambulance support (garrison or off-post).

- What support can they provide?
- What is their level of training?
- Do they have gate access?

Coordinate unit transport (as necessary).

Rehearse to ensure 100% communication (Cell phone dead zones, radio interfaces).

What You Need To Know

- Prevention is more important than treatment
  - Education
  - Planning
- Weak link rule (one case is a problem)
- Heat injuries are cumulative
- Deployment acclimatization 7-10 days
- Dehydration ≠ thirsty
- Febrile illness and fatigue increase risk
- Risk management steps

Heat Injury Prevention posters and cards at:
http://chppm-www.apgea.army.mil/heat/

Questions? Concerns?
Comments?